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Navy Shipbuilding: Proposed Mergers Involving Newport News Shipbuilding – Issues for Congress

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Summary

The six private-sector shipyards that build the Navy's major ships are currently owned by three organizations – General Dynamics Corporation (GD), which owns three of the yards, Northrop Grumman Corporation (NOC), which owns two of them, and Newport News Shipbuilding (NNS), which is an independent, publicly traded shipbuilding company. Both GD and NOC have recently made offers to buy NNS. These two competing merger proposals raise issues for Congress regarding the potential savings they would generate and their potential impact on competition in Navy ship acquisition, on the shipyards' employment levels, and on the shipyards' strength in the political process.

GD and NNS officials state that a GD-NNS merger would generate more than $2 billion in savings over the next 10 years. NOC has not provided any estimate of the potential savings that would result from a NOC-NNS merger. Industry analysts, however, reportedly believe – and NOC has acknowledged – that the savings from a NOC-NNS merger would be less than that from a GD-NNS merger, because the NOC-NNS merger would not create an opportunity for streamlining facilities and management for nuclear-ship construction.

The GD-NNS merger proposal would bring the nation's two submarine shipyards under common ownership and thereby reduce the potential for competition in submarine construction and, perhaps more significantly, submarine design and submarine technology development. A GD-NNS merger would also create an entity that would account for about 70% of the combined revenues, more than 80% of the in-house designers and engineers, and, by the Defense Department's calculation in 1999, more than 95% of the Navy research and development investment directed to the six yards. The GD-NNS merger proposal thus raises questions as to whether the resulting firm would be so dominant in shipbuilding as to make it more difficult for DoD to achieve effective competition in ship acquisition.

The NOC-NNS merger proposal would combine NNS, the longstanding sole source for large-deck, nuclear-powered aircraft carriers, with the only two yards other than NNS that could build large-deck, conventionally powered aircraft carriers. It would also combine NOC/Ingalls, the current effective sole source for large-deck amphibious assault ships, with NNS, the only shipyard outside NOC that could readily build large-deck amphibious assault ships. This could reduce the potential for competition in aircraft carrier and amphibious assault ship construction. The NOC-NNS merger proposal might also have implications for the Navy's ability to maintain effective competition in the acquisition of ship radars and combat systems.

Both merger proposals could have implications for local and regional shipyard employment levels, particularly over the longer run, and both could affect the ability of the six shipyards to compete for defense procurement funds.

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These two competing merger proposals raise issues for Congress regarding the potential savings they would generate and their potential impact on competition in Navy ship acquisition, on the shipyards' employment levels, and on the shipyards' strength in the political process.

This report supercedes two earlier CRS reports on shipyard mergers – RL30251, which focused on shipyard mergers proposed in 1999,[1] and RS20899, which focused on GD's current proposal to buy NNS.[2]

Background

The Navy's Six Major Shipbuilders

Six private-sector shipyards build the Navy's major ships. These shipyards are:

- Avondale Shipyards of New Orleans, LA;
- Bath Iron Works (BIW) of Bath, ME;
- Electric Boat (EB) Corporation of Groton, CT, and Quonset Point, RI;
- Ingalls Shipbuilding of Pascagoula, MS;

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[1]CRS Report RL30251, *Navy Major Shipbuilder Ownership Consolidation: Issues for Congress*, by Ronald O'Rourke. Washington, 1999. (May 27, 1999) 28 p.

[2]CRS Report RS20899, *Navy Shipbuilding: General Dynamics' Proposed Acquisition of Newport News – Issues for Congress*, by Ronald O'Rourke. Washington, 2001 (April 26, 2001) 6 p.

- National Steel and Shipbuilding Co. (NASSCO) of San Diego, CA; and
- Newport News Shipbuilding (NNS) of Newport News, VA.

Until 1995, these six shipyards were owned by six separate organizations. General Dynamics, the longtime owner of EB, purchased BIW in 1995 and NASSCO in 1998. Litton Industries, the longtime owner of Ingalls, purchased Avondale in 1999, and Litton was itself purchased by Northrop Grumman in April 2001. NNS has been an independent, publicly traded company since it was spun off from Tenneco in 1996.

The table below summarizes the current owners of these yards, the number of people employed by the yards in mid-2000, and the types of major Navy ships that the yards have built in recent years.

Table 1. The Six Navy Major Shipbuilders

Yard	Owner	Employees in March 2000	Types of Major Navy Ships Built in Recent Years					
			Nuclear-powered		Conventionally Powered			
			Aircraft Carriers	Submarines	Surface Combatants	Amphibious Ships		Auxiliary & Sealift
						Large Deck (LHA, LHD)	Other (LPD, LSD)	
BIW	General Dynamics	7,600			X		X	
EB		9,074		X				
NASSCO		3,300						X
NNS	Publicly traded	17,260	X	X				
Avondale	Northrop Grumman	6,500					X	X
Ingalls		10,300			X	X		
TOTALS	3 owners	54,034	Number of yards with recent experience, by ship type					
			1	2	2	1	2	2

Source for employment figures: Data provided to CRS, April 25, 2001, by American Shipbuilding Association, which collected the figures from the shipyards.

These six yards have only limited amounts of commercial ship construction and overhaul work and consequently are highly dependent on Navy ship construction contracts. The reduction in Navy ship procurement that began in the early 1990s reduced work loads, employment levels, and total profits at several of the yards. Increased business pressures faced by the yards since the early 1990s appear to have been a major factor behind the consolidation in ownership of the yards that has

occurred since 1995. The consolidation in ownership among the Navy's major shipbuilders, however, has not led to a corresponding consolidation of facilities – the number of organizations that own the yards has been reduced from six to three, but none of the six yards has been closed or shut down.

The Two Current Proposals to Purchase NNS

GD-NNS Merger Proposal. On April 25, 2001, GD and NNS announced an agreement under which GD would purchase NNS for about $2.6 billion, including assumption of about $500 million in NNS debt. The firms said in announcing the merger agreement that, pending shareholder and federal regulatory approval, they expected the acquisition to be completed by the third quarter of 2001.

NOC-NNS Merger Proposal. On May 8, 2001, NOC announced an unsolicited counteroffer to purchase NNS for the same total cost of $2.6 billion, including assumption of the $500 million in NNS debt. In contrast to the GD proposal, which would be an all-cash deal, the NOC offer would purchase NNS's outstanding shares using a combination of NOC stock (75%) and cash (25%).

Executive Branch Review of Proposed Defense Mergers

Proposed defense mergers are reviewed within the executive branch by two agencies – the Department of Defense (DoD) and either the Antitrust Division of the Department of Justice (DoJ) or the Federal Trade Commission (FTC). (Since the FTC is more likely review mergers that might affect the interests of consumers, defense mergers are more likely to be reviewed by DoJ. Additional executive branch agencies might also review defense mergers if they raise issues of concern to those agencies. The section below, for example, cites a case in which a proposed shipyard merger was reviewed in part by the Maritime Administration, an agency within the Department of Transportation.

DoJ/FTC reviews focus on the potential antitrust implications (i.e., the implications for competition) of the proposed merger. DoD reviews of proposed mergers focus on both potential antitrust implications and the potential savings of the proposed merger. DoD Directive 5000.62 of October 21, 1996 – the directive establishing DoD policy relating to mergers and acquisitions of major DoD suppliers – states that it is DoD policy to:

> Assess the potential implications for DoD programs resulting from a merger or acquisition involving a major defense supplier. The assessment shall consider the potential loss of competition for DoD contracts and subcontracts, estimated cost savings or cost increases for DoD programs that can be expected to result from the merger or acquisition, and any other factor resulting from the proposed merger or acquisition that may adversely affect the satisfactory completion of a DoD program.[3]

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[3]Department of Defense Directive Number 5000.62, October 21, 1996, Subject: Impact of Mergers or Acquisitions of Major DoD Suppliers on DoD Programs, page 2. This directive (continued...)

Upon completing their reviews of the GD-NNS and NOC-NNS merger proposals, DoD and DoJ/FTC have the option of approving the GD-NNS proposal, the NOC-NNS proposal, both proposals, or neither.

The 1999 Round of Shipyard Merger Proposals

In 1999, when the six shipyards were owned by four separate organizations – GD with its three yards and Avondale, Ingalls, and NNS each separately owned – a total of four shipyard mergers were proposed:

NNS-Avondale Merger Proposal. On January 19, 1999, the boards of directors of NNS and Avondale announced that they had agreed on a plan to merge the two companies to create a new firm known as Newport News Avondale. This merger proposal received favorable regulatory review from DoD, DoJ, and the Maritime Administration (MARAD), but it was not implemented. (As discussed below, Avondale instead merged with Litton.)

GD-NNS Merger Proposal. On February 18, 1999, NNS announced that GD had made an unsolicited offer to acquire NNS on February 10, 1999. To help satisfy the concerns of NNS's board of directors about whether GD's offer had a "reasonable certainty" of gaining regulatory approval, NNS requested a response from DoD about GD's offer.

On April 14, 1999, DOD announced that it did not support GD's offer. Then-Secretary of Defense William Cohen explained DoD's position in a letter to Senator Trent Lott dated April 15, 1999, which stated, in part:

> As you know, the Department [of Defense] was asked this year to assess two proposed mergers of shipbuilding companies. We did not object to the first, between Newport News and Avondale. Then we received a second proposal, from General Dynamics to acquire Newport News, without Avondale. This was particularly complex because General Dynamics and Newport News are our only nuclear shipbuilders....
>
> Let me get to the bottom line right away. At this time, we judged that it would be in the best interests of the Defense Department that the proposed General Dynamics-Newport News merger not take place. We reached this decision only after extensive analysis, including consultation with the Department of Justice Antitrust Division. It was not an easy decision. The merger offered significant potential cost savings to the Department. At the same time, it would have presented a series of equally significant management challenges. Some of these management challenges exist whether or not we approved the merger....
>
> A significant portion of our analytic effort was devoted to validating the proposed potential savings offered by General Dynamics, as well as opportunities for Newport News to become more efficient as an independent shipbuilding entity.

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[3](...continued)
supercedes a memorandum from the Deputy Secretary of Defense, "Antitrust Aspects of Defense Industry Consolidation," of May 10, 1995,

We concluded that a General Dynamics-Newport News merger offered substantial potential savings. We asked, however, whether a large portion of those savings could be achieved without a merger. The Navy and Newport News entered into discussions to this end. The result of these discussions was an understanding on aggressive cost management that we expect to achieve more than half of the potential savings in a General Dynamics acquisition of Newport News.

Against this backdrop, we concluded that a merger at this time was not the preferred course of action. We believe that the Navy should have the opportunity to evaluate whether Newport News can streamline operations and lower costs as agreed. If Newport News can't demonstrate lower costs over the next few years, the Department would be open to more far-reaching solutions.

As I noted above, we also considered carefully several significant competitive challenges presented by this merger....

As to whether this merger significantly reduces actual or potential competition, it is important to segment the shipbuilding market into its five sectors: aircraft carriers, nuclear submarines, complex surface combatants, amphibious ships, and auxiliary ships.... For nuclear submarines, this merger would collapse the two existing yards into a single entity. Here we would lose the potential for competition. There was a question, however, of how to appraise how much competition would be lost, where each yard, as at present, is guaranteed an equal share of [submarine construction] work, a condition which would prevail for at least the next five years.

In the non-nuclear yard area the merger would have more complicated effects.... The competitive base would be less robust if Newport News was merged into General Dynamics, and Avondale and Ingalls (much smaller yards) competed separately or together.... On balance, we judged that we could retain some competition where it mattered over the next 10-15 years, even in the face of the proposed merger, but that there were considerable risks that competition would be less robust.

These risks were enhanced by the second issue: a disproportionate balance of engineering talent between a combined General Dynamics-Newport News on the one hand and the remaining conventional yards on the other. Our analysis showed that over 75% of the total shipyard engineering talent and over 95% of the Navy R&D investment would exist in a combined General-Dynamics-Newport News entity. This is because the Navy has historically maintained a large R&D program funded through its nuclear shipyards; i.e., General Dynamic's [sic] Electric Boat Division and Newport News. If General Dynamics and Newport News were to merge, we would see a concentration of that engineering talent – and the technology advantages that may have resulted from Navy-funded research and development investments in both firms over the years.

We were struck by the fact that the larger of the non-nuclear yards, Ingalls, did not object to the General Dynamics-Newport News merger. While taking this position, however, Ingalls recognized the advantages such a combination would present to the two nuclear yards and indicated to us that we would need to take compensating actions to transfer R&D and technology developments to the remaining non-nuclear yards. Alternatively, the Navy could invest more heavily in conventional shipbuilding R&D through the remaining yards. We did not

> attempt at this point to estimate the magnitude of the required investment and the efficiency of compensating actions....
>
> As I said earlier, this is not an easy decision. On balance, we decided that the considerable potential savings made possible by the proposed merger were offset by efficiency opportunities at Newport News. While there still was an important differential, we felt this differential was not now so great as to override the management and competitive challenges we could face from the merger. This overall conclusion, however, could well change if Newport News is not able to become a more efficient operation in coming years.[4]

DoD made many of these points in shorter form in a news release dated April 14, 1999 announcing its decision.[5]

With regard to the potential for NNS to achieve efficiencies independent of a merger, on April 13, 1999 – the day before DoD announced its opposition to the GD-NNS merger proposal – the Navy and NNS signed a memorandum of understanding (MOU) on measures that both parties would take to permit Newport News to reduce its costs by $360 million over the 5-year period 1999-2003, including $25 million in 1999, $55 million in 2000, $80 million in 2001, and $100 million per year in 2002 and 2003. (Similar savings apparently would continue to accrue in years beyond 2003.)

Following DoD's announcement, GD withdrew its offer and indicated that it would pursue other acquisition opportunities.[6]

Litton-Avondale and Litton-NNS Merger Proposals. On May 6, 1999, Litton Industries, which was then the owner of Ingalls, announced that it had made simultaneous unsolicited offers to acquire Avondale and NNS. Litton stated that it was prepared to complete either or both of its offers. Neither offer, Litton stated, was conditioned upon acceptance of the other offer.

On May 28, it was reported that DoD had informed Litton, Avondale, and NNS that, on the basis of a preliminary assessment, DoD would not object to a Litton-Avondale merger but would object to a Litton-NNS merger. The *New York Times* reported:

> "The Navy has indicated to all interested parties that the Navy, in principle, has no objection to Litton's acquisition of Avondale Industries," said a top Pentagon official. "The Litton-Newport News transaction is more complex and presents numerous challenges for the Navy" that the official said "could not be overcome."
> ...

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[4]Letter from The Secretary of Defense to the Honorable Trent Lott, April 15, 1999.

[5]U.S. Department of Defense. Office of the Assistant Secretary of Defense (Public Affairs). Secretary Cohen Announces Decision on General Dynamics and Newport News Shipbuilding Merger Proposal. Washington, 1999. (News Release No. 169-99, April 14, 1999.) This news release is available at DoD's NewsLink site on the Internet, [http://www.defenselink.mil/] .

[6]GD Pulls Offer for Newport News After DOD Rejects Combination. *Defense Daily*, April 16, 1999: 90.

> Capt. Mike Doubleday, a Defense Department spokesman, said that the Pentagon was not asked to make a formal evaluation of the deal but, "when we learned of the merger plan, we made this preliminary assessment and this is how we came out."
>
> "We have informally conveyed these preliminary views to these three companies and to interested parties on the Hill," he said.
>
> Doubleday said that with the Litton-Avondale merger, "there were no significant anticompetitive effects and there was substantial potential for savings."
>
> In the case of a Litton-Newport News merger, he added, "the effects on competition were in no way offset by the savings."[7]

At a May 28, 1999 press briefing, Secretary of Defense William S. Cohen was asked about DoD's positions on the Litton-NNS merger proposal:

> Question: Mr. Secretary, may I ask a business question[?] Litton and Newport News have been notified by the Pentagon after preliminary assessments, [that] they [at the Pentagon] don't approve of the potential transaction. Can you give a little bit of the Department's thinking? And should industry see this as a signal of your slowing down [merger] approvals?
>
> Cohen: No, the fact is that there was a preliminary analysis done on this and the word, I believe, was given yesterday or the day before to the industries involved that there was a proposal to acquire Avondale on the part of Litton and that has been approved.
>
> Question: Why not Newport News?
>
> Cohen: The same kind of considerations that were involved when GD also sought for that kind of approach [i.e., to merge with NNS], namely, the concentration of power and the anti-competitive aspects of it. It was just, again, [a] preliminary determination that kind of concentration would be contrary to our interests in maintaining separate facilities.[8]

As a consequence of DoD's preliminary assessment that it would not object to a Litton-Avondale merger, Avondale could choose to merge with either NNS or Litton. On June 2, 1999, it was reported that Avondale was ready to accept Litton's merger proposal, which was an all-cash bid that offered a higher price for Avondale than NNS's stock-transaction proposal.[9] The Litton-Avondale merger was

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[7]Wayne, Leslie. Pentagon Opposes One Bid By Litton, But Not Another. *New York Times*, May 28, 1998. See also Smart, Tim. Navy to Fight Shipbuilding Merger. *Washington Post*, May 28, 1999: E10; Capaccio, Tony. Litton Industries Bid to Buy Newport News Shipbuilding Opposed by Pentagon. Bloomberg news service, May 28, 1999.

[8]Transcript of DoD New Briefing, May 28, 1999, available on the Internet at [http://www.defenselink.mil/news/May1999/t05281999_t05281999.html] .

[9]Pasztor, Andy. Avondale Says It is Ready to Accept Litton Industries' $529 Million Offer. (continued...)

implemented, and two years later, Litton was purchased by Northrop Grumman, creating the current ownership situation.

NNS today is thus in a situation similar to that of 1999, in which it faced competing offers from General Dynamics and Litton (now Northrop Grumman). Since neither of the mergers proposed in 1999 received favorable regulatory review from DoD, some observers have asked what might have changed since 1999 to give GD and NOC reason to believe that DoD and DoJ would review the current merger proposals favorably.

One possibility is that GD and NOC might believe that the Bush Administration will examine issues relating to proposed defense mergers differently than the Clinton Administration did in 1999.[10] Another possibility, in light of then-Secretary of Defense William Cohen's above-discussed April 15, 1999 letter to Senator Lott, is that GD and perhaps NOC believe that sufficient evidence has accrued since 1999 to call into question NNS's ability to generate the internal efficiencies referred to in Secretary Cohen's letter, and that DoD, to quote Cohen's letter, might consequently now "be open to more far-reaching solutions." In addition, supporters of the GD-NNS merger proposal argue that NOC's purchase of Litton in early April 2001 created a stronger competitor for a combined GD-NNS entity than Litton by itself would have been in 1999.

Issues for Congress

As mentioned at the outset, the GD-NNS and NOC-NNS merger proposals raise issues for Congress regarding the potential savings of shipyard mergers and the potential impact on competition in Navy ship acquisition, on the shipyards' employment levels, and on the shipyards' strength in the political process. Each of these issues is discussed below.

Potential Savings From Mergers

One issue that Congress may consider in assessing the GD-NNS and NOC-NNS merger proposals is the potential savings that might result from either merger. As discussed in the background section, potential savings are one of two principal assessment criteria set forth in DoD's directive regarding policy for reviewing proposed defense mergers.

Sources of Savings. Shipyard mergers can lead to savings to the federal government and taxpayers in several areas, including the following:

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[9](...continued)
Wall Street Journal, June 2, 1999; Avondale Plans to Accept Litton's $500 Million Offer. *Aerospace Daily*, June 2, 1999.

[10]For an article discussing how the Bush Administration may view the issue of competition in defense acquisition, see Muradian, Vago. Pentagon Wants More Competition; Stance And Reviews May Impact NNS' Fate. *Defense Daily*, May 14, 2001: 8.

- **Facilities.** Bringing two or more shipyards under common ownership can provide opportunities for closing or reducing unneeded, redundant, or excess shipyard facilities, and thus for eliminating or reducing the fixed overhead costs associated with maintaining these facilities. Facilities-related fixed overhead costs can include items such as depreciation, insurance, rent, property taxes, utilities, cleaning and waste removal, maintenance and repair, and security costs.

- **Centralized Personnel and Expenditures.** Shipyard mergers can provide opportunities to combine and streamline previously separate headquarters, central administrative, and design and engineering staffs, and to reduce centralized expenditures for items such as computers and data processing (including computer-aided design costs), independent research and development (IRAD), corporate allocation costs (i.e., corporate office allocation costs and franchise taxes), and marketing activities.

- **Materials and Components.** Shipyards under common ownership can lower the costs of their purchases of materials and components by combining their purchases into larger bulk orders.

- **Best Practices.** Shipyards under common ownership can share their best business practices — their trade secrets — and combine their respective strengths in areas such as strategic business planning, facility management, project management and supervision, in-house design and engineering, worker training and supervision, material and component purchases, subcontractor relationships, and shipyard production processes and techniques.

- **Distribution of Workload.** The managers of a multi-yard organization can shift work from one yard to another, so as to avoid or minimize potentially expensive fluctuations in the workload at individual yards or take advantage of the ability of one yard to perform certain elements of work at lower cost.

- **Availability and Cost of Capital.** Becoming part of a multi-yard shipbuilding organization can give a shipyard improved access to investment capital that can be used to modernize the yard's facilities and thereby make them more efficient. The yard's new owner might have a pool of capital readily available, or the yard, by virtue of becoming part of a larger organization, might now be able to borrow capital at lower interest rates.

Savings under GD-NNS Merger Proposal.

Facilities-related Savings. GD officials have indicated that GD would not close any of its shipyards following a GD-NNS merger. This would limit the potential savings that could be realized from reducing facilities. Even so, a GD-NNS merger could still lead to some streamlining of tools or facilities, particularly if these tools or facilities perform limited amounts of work and the intermediate products made by these tools or facilities can be easily and economically transported from one yard to another.

GD officials have stressed a GD-NNS merger would make possible streamlining in the management of nuclear-ship construction. Some of these savings could come in the form of elimination of duplicate tools or facilities for building nuclear-powered ships.

Centralized Personnel and Expenditures. Similarly, the opportunity created under a GD-NNS merger to streamline the management and supervision of nuclear-ship construction could add to the total potential savings that a GD-NNS merger could generate in the area of centralized personnel and expenditures.

Best Practices. Savings under a GD-NNS merger due to sharing of best practices may be limited by the fact that GD and NNS have already shared best business practices for building submarines as part of their current arrangement for jointly building Virginia (SSN-774) class submarines. The two firms, however, might still be able to share previously withheld best practices that do not relate to submarine construction.

Potential Total Savings. GD and NNS officials state that a GD-NNS merger would generate more than $2 billion in savings over the next 10 years, or an average of more than $200 million per year.[11] This is somewhat less than the savings estimate provided for the 1999 GD-NNS proposal – an estimate which included some cost savings that NNS may have been able to generate on its own since 1999 through changes in its internal business practices.[12] Supporters of the GD-NNS merger proposal argue that of the two merger proposals involving NNS, only the GD-NNS proposal offers the potential for significant savings, since only a GD-NNS would permit streamlining in the management of nuclear-ship construction.

Savings under NOC-NNS Merger Proposal.

Facilities-related Savings. NOC has stated that it has no plans to close any of its shipyards following a NOC-NNS merger.[13] This would again limit the potential savings that could be realized from reducing facilities. A NOC-NNS merger, moreover, would not create an opportunity for streamlining and consolidation in the area of nuclear-ship construction. But a NOC-NNS merger might nevertheless lead to some streamlining of tools and facilities, particularly if these tools or facilities perform limited amounts of work and the intermediate products made by these tools

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[11]Gilpin, Kenneth N. Northop Grumman Is Long On Defenses Of Its Bid For Newport News. *New York Times*, May 10, 2001; Squeo, Anne Marie. Northrop's Newport News Bid Will Force Bush Administration To Spell Out Policy. *Wall Street Journal*, May 10, 2001.

[12]Supporters of the 1999 GD-NNS merger proposal reportedly argued at the time that it would save the Navy $2.5 billion over the 9-year period 1999-2007, or an average of $280 million per year, and possibly as much as $4 billion over the next decade. A subsequent press report stated that DoD was able to verify about two-thirds of the $2.5 billion; the remaining third, DoD concluded, was possible but could not be verified. After DoD announced its opposition to the merger, the Navy stated that while GD had predicted a savings of $190 million to $280 million per year, the Navy had assessed the savings at $115 million to $200 million per year – roughly 60% to 70% of GD's estimate.

[13]Source: Telephone conversation with senior NOC official, May 16, 2001.

or facilities can be easily and economically transported from one yard to another. All three of the yards in question build large surface ships, and two of them – Ingalls and NNS – specialize in the construction of large surface ships with complex combat systems.[14] This may create an opportunity to streamline tools and facilities involved in the production of such ships.

Centralized Personnel and Expenditures. Although a NOC-NNS merger, unlike a GD-NNS merger, would not create an opportunity to streamline the management and supervision of nuclear-ship construction, it might still generate other savings in the area of centralized personnel and expenditures.

Best Practices. A NOC-NNS merger might present a greater opportunity for sharing of best practices than a GD-NNS merger, since NOC and NNS, unlike GD and NNS, are not involved in a major joint-production arrangement and thus have not already had occasion to share some of their best practices with one another.

Potential Total Savings. NOC has not provided any estimate of the potential savings that would result from a NOC-NNS merger, because NOC, unlike GD, does not have access to NNS's books and would not gain access until NNS's board of directors approves NOC's bid.[15] Industry analysts, however, reportedly believe that the savings from a NOC-NNS merger would be less than that from a GD-NNS merger, because the NOC-NNS merger would not create an opportunity for streamlining facilities and management for nuclear-ship construction.[16] Ken Kresa, the chairman and chief executive of NOC, said, "My initial view is the savings [from a NOC-NNS merger] would not be as high" as those from a GD-NNS merger.[17] Supporters of the NOC-NNS merger proposal argue that the savings from a NOC-NNS merger, though perhaps less than those that would be realized from a GD-NNS merger, would still be significant.

Potential Effect On Competition

Another factor that Congress may consider in assessing the GD-NNS and NOC-NNS merger proposals is the potential effect that either merger would have on competition in Navy ship acquisition (i.e., design and construction of ships). Many policymakers believe that, as a general rule, competition in defense acquisition can generate benefits for the government and taxpayers by restraining acquisition costs, improving product quality, encouraging adherence to scheduled delivery dates, and promoting innovation. As discussed in the background section, potential antitrust implications (i.e., implications for competition) are the principal focus in DoJ/FTC

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[14]A ship's combat system includes its sensors (such as radars), its computers, software, and displays for processing sensor data and displaying it, its weapons launchers, and its weapons.

[15]Gilpin, Kenneth N. Northrop Grumman Is Long On Defenses Of Its Bid For Newport News. *New York Times*, May 10, 2001.

[16]Squeo, Anne Marie. Northrop's Newport News Bid Will Force Bush Administration To Spell Out Policy. *Wall Street Journal*, May 10, 2001.

[17]As quoted in Gilpin, Kenneth N. Northrop Grumman Is Long On Defenses Of Its Bid For Newport News. *New York Times*, May 10, 2001.

reviews of proposed mergers, and are one of two principal assessment criteria set forth in DoD's directive regarding policy for reviewing proposed defense mergers.

Competition Currently Rare in Ship Construction. Although the Navy used competition extensively in ship construction in the 1980s and early 1990s, particularly in the awarding of annual contracts for the construction of surface combatants and nuclear-powered attack submarines, competition is less prominent in Navy ship construction activities today.

The Navy is currently conducting a competition between two industry teams — one led by General Dynamics/BIW, the other by Northrop Grumman/Ingalls — for the right to develop the design for the Navy's next-generation surface combatant, the DD-21 land attack destroyer, which is scheduled to begin procurement in FY2005. The Navy has indicated, however, that regardless of who wins the design competition, BIW and Ingalls will build DD-21s in roughly equal numbers.[18] The Navy is also conducting a competition to design the new Lewis and Clark (TAKE-1) class Navy auxiliary dry cargo ship (previously known as the ADC(X) class).

For major Navy ship programs now in production, however, there is little active use of competition:

- Nuclear-powered aircraft carriers are a sole-source item — NNS is the only yard currently capable of building large-deck nuclear-powered carriers and has built every carrier procured since FY1958.[19]

- Virginia (SSN-774) class nuclear-powered attack submarines are being jointly produced by EB and NNS under a teaming arrangement worked out by the two shipbuilders and approved by the Administration and Congress in 1997 that divides the value of the work between the two yards on a roughly equal basis.[20]

- Arleigh Burke (DDG-51) class destroyers since FY1994 have been allocated by the Navy to BIW and Ingalls on an essentially equal basis.

- San Antonio (LPD-17) class amphibious ships are being divided up by Avondale and BIW — the two yards on the industry team that won the

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[18]For more on the DD-21 program, see CRS Report RS20698, *Navy Zumwalt (DD-21) Attack Destroyer Program: Background Information and Issues for Congress*, by Ronald O'Rourke. Washington, 2000. (Updated periodically.) 6 p.

[19]For more on the Navy's aircraft carrier acquisition programs, see CRS Report RS20643, *Navy CVN-77 and CVX Aircraft Carrier Programs: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 2001. (Updated periodically.) 6 p.

[20]For more on the Virginia-class program, see CRS Report RL30045, *Navy Attack Submarine Programs: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 2000. (Updated periodically) 37 p.

competition to build the 12-ship class — on a 2-ships-for-1 basis, respectively.[21]

- Wasp (LHD-1) class large-deck amphibious assault ships are effectively a sole-source item — Ingalls has produced all 7 procured to date and would be the presumptive builder of any additional such ships that are procured.[22]

- Sealift ships are being built in equal numbers by NASSCO and Avondale as a result of decisions by the Navy to exercise options to construction contracts for these ships that the Navy awarded to the two firms in 1993.

The current limited active use of competition in Navy ship construction appears to be a consequence to a large degree of two key factors: One is the relatively low rate of Navy ship procurement supported since about FY1993. The other is an apparent unwillingness of policymakers to take any steps that might force any of the six shipyards out of the Navy shipbuilding business.[23] Together, these two conditions make it difficult for the Navy to create uncertainty about its shipbuilding contract-award decisions — a key requirement for generating effective competition in ship construction.

Potential Factors to Consider. Given the limited use of competition in Navy ship-construction activities today, the issue for Congress and the Administration appears to be what effect the two proposed shipyard mergers might have on preserving competition in ship design and technology development and on the potential for resuming competition in Navy ship construction in the future, particularly if the Navy ship procurement rate in future years is increased from current levels.

In examining the effect that the proposed mergers might have on ship design and ship technology development and on the potential for resuming competition in Navy ship construction, policymakers may consider several factors, including the following:

- creation of sole sources,
- resulting market share,
- resulting number of independently owned shipyard in-house design and engineering staffs,
- resulting share of shipyard in-house designers and engineers,
- resulting share of Navy research and development funding provided to shipyards, and
- resulting degree of vertical integration.

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[21]For more on the LPD-17 program, see CRS Report RS20862, *Navy Amphibious Shipbuilding Programs: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 2001. (Updated periodically.) 6 p.

[22]For more on the LHD program, see CRS Report RS20862, *Navy Amphibious Shipbuilding Programs: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 2001. (Updated periodically.) 6 p.

[23]For a more detailed discussion, see CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, by Ronald O'Rourke. Washington, 1996. (September 24, 1996) p. 18-19, 60-64.

Creation of Sole Sources. The existence of at least two independently owned sources for an item is usually a requirement in instances where the government wants to make maximum use of competition in the acquisition of that item. A merger that results in the creation of a sole source for an item can thus reduce, perhaps significantly, the potential for using competition in the acquisition of that item. In expressing its opposition to the 1999 GD-NNS merger proposal, DoD noted that such a merger would combine the nation's two submarine-construction shipyards under common ownership.

Creation of a sole source, however, does not eliminate entirely the government's ability to use competition in the acquisition of that item: The government can mandate the use of competition among supplier firms in the acquisition of materials and components that are incorporated into the end item manufactured by the sole source. The government can also make it clear to the sole source that its end item (in this case, a particular kind of ship) will compete for scarce defense procurement dollars against other end items that contribute to U.S. defense needs (such as other types of ships, aircraft, missiles, ground combat systems, space systems, and command and control systems).

In the view of some observers, creation of a sole source for a given item, in addition to reducing the potential for using competition in the acquisition of that item, can also weaken or distort competition in the acquisition of other items made by the sole source. Under this argument, the sole source can leverage its monopoly position on a certain item to negotiate contracts for that item with high profit margins, which can then be used to cross-subsidize bids that the sole source makes for contracts to build other end items where the firm does face competition from other competitors. Several years ago, for example, some supporters of EB – but not GD or EB itself – argued that NNS had in the past used its sole-source status on aircraft carriers to negotiate high profit margins on carrier construction contracts that were then used to cross-subsidize bids it submitted against EB for submarine construction contracts.

Market Share. Current and potential market shares are sometimes examined to get a preliminary or general sense of whether a proposed merger might produce a firm so dominant within the market for producing a particular product that competition within that market might be eliminated or substantially reduced: The dominance of the leading firm could discourage other firms from attempting to enter the market for making items made by the leading firm. DoD did not, however, specifically refer to market share in announcing its objections to the 1999 merger proposals involving NNS.

As of 1999, the six shipyards together accounted for about 98% of the dollar value of new-construction Navy shipbuilding work performed in U.S. shipyards, and new-construction Navy shipbuilding work in turn accounted for an estimated 85% to 90% of the total revenues of these six yards.[24] An examination of the total revenues

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[24]Source for figures: Telephone conversation with the American Shipbuilding Association (the trade association that includes these six yards, along with a number of other maritime firms), May 19, 1999.

of these six yards can thus provide an approximation of these yards' market shares for Navy shipbuilding.

Total revenues for these six yards during the 1990s ranged between about $6.3 billion and $7.2 billion per year. Table 2 below shows the approximate shares of these revenues by yard.

Table 2. Shares of the Six Yards' Combined Revenues, by Yard

Yard	Share of Total Revenues	
	1998	Range for 1990s
GD, of which:	42.2%[a]	40%-46%[c]
(BIW)	*(n/a)*[b]	*(11%-13%)*[d]
(EB)	*(n/a)*[b]	*(24%-25%)*[e]
(NASSCO)	*(n/a)*[b]	*(4%-9%)*[f]
NNS	29.5%	25%-31%[g]
NOC, of which:	28.3%	23%-34%[g]
(Avondale)	*(11.9%)*	*(7%-12%[g])*
(Ingalls)	*(16.4%)*	*(16%-22%[g])*
Total	100%	100%

Source: CRS analysis of revenue data for the shipyards for 1991-1998 taken from the shipyards' filings to the Securities and Exchange Commission (SEC), as presented on the Internet at www.coltoncompany.com.

a Percentage reflects revenue for GD's Marine Systems group, which includes BIW, EB, NASSCO, and a fourth company, the American Overseas Marine Corporation (AMSEA), which is a relatively small firm (about 350 employees) that operates and manages 16 DoD sealift ships and (through a wholly-owned subsidiary) provides water shuttle services in Boston Harbor.

b Since 1995, GD has reported only the combined revenue for the Marine Systems group.

c Range reported for the 1990s is a synthetic calculation for 1991-1997, provided for purposes of comparison to the 1998 figure, that reflects the combined revenues for BIW, EB, NASSCO, and (since 1995) AMSEA, even though BIW and NASSCO did not become part of GD until 1995 and 1998, respectively. (In 1995, the synthetic calculation dropped to 34.3 %, but this appears to have been a one-time dip.) In 1995, when the actual reported revenue figure for the Marine Systems group included revenues for EB and AMSEA only, the group accounted for 27.1% of total revenues; in 1996 and 1997, when the actual reported figure also included BIW's revenues, the group accounted for 35.2 and 36.7% of total revenues, respectively.

d Range reflects figures for 1991-1995. BIW became part of GD in 1995.

e Range reflects figures for 1991-1994. EB and AMSEA became part of the Marine Systems group in 1995.

f Range reflects figures for 1991-1997. NASSCO became part of GD in 1998.

g Range reflects figures for 1991-1998.

Number of Shipyard In-house Design and Engineering Staffs. In addition to building ships, the six shipyards maintain in-house design and engineering staffs that design Navy ships and develop new technologies for Navy ships. Maintaining competition in this area may be of greater importance now than in the past, since the Navy in recent years has shifted more of its ship design and engineering

work out of its own public-sector ship-design and engineering organizations, and to the private-sector shipyards.

Since innovations in a given area are sometimes made more likely when several separate organizations working in parallel are available to conceive of, and experiment with, new strategies for addressing a common challenge, a reduction in the number of independently owned shipyard in-house shipyard design and engineering staffs might make it more difficult to promote innovation in Navy ship design and technology, particularly for specific ship types or in specific technology areas. Both the GD-NNS and NOC-NNS merger proposals would reduce the number of independently-owned shipyard design and engineering staffs from three to two.

Alternatively, it can be argued that either the GD-NNS or NOC-NNS merger proposals could, for a time at least, improve innovation in ship design and ship technology development by creating an enlarged engineering staff at either GD or NOC that encompassed a greater diversity of talents and ideas. New technologies and innovations, it can be argued, can sometimes be spurred when members of previously separate organizations are brought together under common ownership and as a consequence are permitted to share ideas, "bounce" thoughts off one another, "cross-fertilize" their thinking, and combine separately conceived and isolated concepts into a testable new approach. Shipyard mergers, in this view, may create a larger "critical mass" of design and engineering talent for generating innovations. In this sense, depending on how GD or NOC manages the flow of promising ideas and concepts between their constituent yards, shipyard mergers might, for a time at least, increase the likelihood for innovations in ship design and ship technology development.

If the Navy perceives that the potential for innovation in ship design and ship technology development has been reduced by the reduction in the number of in-house design and engineering staffs, it could attempt to compensate by placing ship-design and ship technology-development contracts with independently owned naval architectural firms and other entities (such as universities and technology companies) that engage in activities relating to ship design and ship technology development.

Share of Shipyard In-house Designers and Engineers. The division of the shipyards' total number of in-house designer and engineers that would result from a GD-NNS or NOC-NNS merger is a potentially important measure because designers and engineers can create new designs and develop new technologies that can be sources of competitive advantage to a shipbuilding organization when the organization incorporates the new designs and technologies into bids for future Navy ship acquisition programs. As noted earlier, DoD, in explaining its opposition to the 1999 GD-NNS merger proposal, noted that a combined GD-NNS entity would include more than 75% of the six yards' in-house designers and engineers.

Table 3 below shows the approximate sizes of the in-house design and engineering staffs at the six yards in 2001 and 1999.

Table 3. Approximate number and Share of In-house Designers and Engineers at the Six Yards

Yard	Designers and Engineers			
	Data for 2001		Data for 1999	
	Approximate Number	Approxi-mate Share	Approximate Number	Approxi-mate Share
GD, of which	5,250	44%	5,600	48%
(BIW)	*(1,850)*	*(15%)*	*(1,200)*	*(11%)*
(NASSCO)			*(200)*	*(2%)*
(EB)	*(3,400)*	*(28%)*	*(4,000)*	*(35%)*
NNS	4,600	38%	4,000	35%
NOC, of which	2,150	18%	1,975	17%
(Avondale)	*(2,150)*	*(18%)*	*(475)*	*(4%)*
(Ingalls)			*(1,500)*	*(13%)*
Total	12,000	100%	11,375	100%

Sources: Data for 2001 provided to CRS by GD on May 17, 2001. Similar figures can be derived from McCarthy, Mike, and John M. Donnelly. Worries About Competition Surround Bids For Newport News. *Defense Week*, May 14, 2001: 1, 13, 15. Data for 1999, taken from CRS Report RL30251, based on telephone conversations with GD, Avondale, Ingalls, and NNS officials, May 18-21, 1999.

As can be seen in the table, EB and NNS maintain relatively large in-house design and engineering staffs, BIW and Ingalls maintain smaller but still substantial in-house staffs, and Avondale and NASSCO maintain relatively small in-house staffs. The staffs at EB and NNS are the only two among the six yards that have extensive experience and resources in the design and engineering of submarines and nuclear-powered ships.[25]

As discussed above, although a concentration of design and engineering talent could suppress innovation, it can also be argued, conversely, that new technologies and innovations can sometimes be spurred, at least for a time, when members of previously separate organizations are brought together under common ownership and as a consequence are permitted to share ideas, bounce thoughts off one another, cross-fertilize their thinking, and combine separately conceived and isolated concepts.

[25]In addition to these in-house staffs, the private sector also includes independently owned naval architectural and engineering firms that can be hired by shipyards to supplement their own capabilities.

Share of Navy Research and Development Funding. As noted earlier, Secretary of Defense Cohen, in explaining DoD opposition to the 1999 GD-NNS merger, stated that

> over 95% of the Navy R&D investment would exist in a combined General-Dynamics-Newport News entity. This is because the Navy has historically maintained a large R&D program funded through its nuclear shipyards; i.e., General Dynamic's [sic] Electric Boat Division and Newport News. If General Dynamics and Newport News were to merge, we would see a concentration of that engineering talent – and the technology advantages that may have resulted from Navy-funded research and development investments in both firms over the years.

This concern is similar to the concern regarding the resulting share of the total number of in-house designers and engineers. Rather than focusing on personnel, however, this concern appears to relate to research, development, and design facilities and technology that may have accumulated at EB and NNS over the years – facilities and technology that would be at the disposal of the combined GD-NNS in-house engineering staff.

Vertical Integration. An additional potential factor to consider in assessing the GD-NNS and NOC-NNS merger proposals (or other defense merger proposals) is the amount of vertical integration that would result. Vertical integration refers to the existence, within a single firm, of operations pertaining to different stages of the production process for a particular item – a process that, in its entirety, begins with raw materials and component manufacturing, continues through assembly of subsystems and systems and other intermediate components, and finishes with final assembly and total-system integration and testing.[26] The concern is that vertically integrated firms can undermine competition in various stages of the production process by relying on their own in-house capabilities for performing work rather than bidding the work out to the remaining firms engaged in that stage of the production process.

Potential for Competition under GD-NNS Proposal.

Creation of Sole Sources. The GD-NNS merger proposal would transfer the existing sole source for aircraft carriers (NNS) to GD and create a second sole source by bringing the nation's two submarine shipyards under common GD ownership.

Competition in Submarine Construction. Supporters of the GD-NNS merger proposal could argue that competition has not been used in the awarding of contracts

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[26]Horizontal integration, in contrast, refers to the existence within a single firm of operations in certain stages of the production process for producing significantly different end products. In a simplified example, a firm that takes raw materials in one end and produces fully complete end items (such as ships) at the other end, performing all the manufacturing, assembly, integration and testing steps in between, is said to exhibit complete vertical integration, while a firm that specializes in certain stages of the production process for significantly different products (such as manufacturing of components for, or final assembly of, ships, aircraft, and land vehicles) is said to exhibit horizontal integration.

to build submarines since the Navy awarded to EB the contract to build SSN-22, the second Seawolf (SSN-21) class submarine, which was procured in FY1991. Since EB had previously been awarded the contract to build the lead ship in the class (SSN-21), many observers believed that EB could use its experience in building SSN-21 and SSN-22 to out-compete NNS for the contract to build the third Seawolf-class submarine (SSN-23) and any subsequent Seawolf-class boats (of which there were none).

Supporters of the GD-NNS merger proposal could argue that this de facto suspension in the use of competition in the awarding of submarine-construction contracts was reinforced by Congress' decision in 1997 to approve a plan proposed by the Navy, EB, and NNS to have EB and NNS build the first 4 Virginia (SSN-774) class submarines under a joint-production arrangement, and further reinforced by Congress' decision in 2000 to extend the joint-production arrangement to the following 5 ships in the program (i.e., through the ninth ship). These decisions to adopt and extend the joint-production arrangement, they can argue, reduced the chances of resuming competition in the awarding of contracts to build submarines at some point in the future, because doing so would require separating the now-entangled submarine construction activities at EB and NNS from one another and possibly reestablishing certain elements of the submarine production lines at one or both yards.

Opponents of the GD-NNS merger proposal could argue that although the joint-production agreement would make it more difficult to resume competition in submarine construction, a GD-NNS merger would further reduce the chances of resuming competition at some point in the future because doing so would likely require GD to sell either EB or NNS to a another company – something GD might not be willing to do.

The potential for resuming competition would also depend on future submarine production rates. The current production rate of about 1 boat per year is insufficient for achieving meaningful competition between two independently owned submarine builders. Opinions differ on the minimum procurement rate needed to support meaningful competition. The Navy at one point a few years ago suggested that a rate of 1.5 boats per year might be sufficient for staging biennial competitions. At this rate, the Navy explained, the Navy every other year could combine two years' worth of procurement (3 boats), allocate one boat to each yard, and have the two yards compete for the third. A higher procurement rate, such as 3 boats per year, would be needed to support competition on an annual basis.

Supporters of the GD-NNS merger could argue that future submarine procurement rates might not increase significantly from the current rate, particularly given the relatively high procurement cost of submarines and competing demands for defense procurement funding. Opponents of the GD-NNS merger proposal could argue that such increased rates are possible in future years, particularly given the need to maintain the submarine fleet at levels set forth by DoD officials and the possibility that changes in military technology and U.S. military strategy could lead to an increase in the desired number of submarines in the Navy.

Competition in Submarine Design and Technology Development. In 1997, supporters of the joint-production proposal argued that it would be acceptable from a competition standpoint because EB and NNS would continue to compete for secondary Navy contracts for submarine design and submarine technology development work. The use of competition between the two firms, they argued, would thus be preserved in the important area of generating new ideas and technologies for future submarines.

For example, at March 18, 1997 hearing before the Military Procurement subcommittee of the House National Security Committee[27] that focused on the acquisition strategy for the Virginia class (then known as the New Attack Submarine), John Douglass, then-Assistant Secretary of the Navy for Research, Development, and Acquisition – the Navy's acquisition executive – discussed the Navy's plan for inserting new technologies into the Virginia-class design, and stated:

> We use the term "technology opportunities" because we wanted to make sure that our contractors understand this is not a done deal. We want them to compete for these technologies. We want their engineering teams, which are hungry for work, to know that we are going to take the best engineering ideas from either yard and try to inject them into the boats as soon as possible and part of this competition for ideas, competition for technology is based on some of the principles that this committee has put forward.
>
> But this is our commitment, Mr. Chairman,[28] and as long as I am there, I am going to do the very best that I can to get us to stick to it.[29]

The issue came up again later in the hearing in this exchange:

> [Representative Patrick Kennedy:] I want to just ask perhaps one question with respect to how we get R&D into the process, and that is how, Secretary Douglass, do you plan to encourage competition between the yards with respect to new technology and how also can you explain what role Newick [sic][30] will have in that process, as well, and how they would be kept in the loop.
>
> Secretary Douglass: Well, from the – in the first part of your question, how do we plan to get the yards involved and stimulate technology and engineering work. We are making the yards fully aware of how much money we are requesting from the Congress, not only next year but in the out years, and we have asked them

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[27]The House Armed Services Committee was known as the House National Security Committee during the 104th and 105th Congresses (i.e., 1995-1998).

[28]The subcommittee chairman was Representative Duncan Hunter.

[29]U.S. Congress. House. Committee on Armed Services. *Hearings on National Defense Authorization Act for Fiscal Year 1998 – H.R. 1119, and Oversight of Previously Authorized Programs.* 105th Cong., 1st Sess., Title I – Procurement. Washington, U.S. Govt. Print. Off., 1998. (H.N.S.C. No. 105-3, Hearings held March 11, 12, and 18, April 8, 10 and 15, 1997.) p. 246-247.

[30]This was a reference to the Naval Undersea Warfare Center, or NUWC, an acronym that is pronounced, and was transcribed here phonetically, as "Newick."

to go and look at that budget and give us their proposals for what they think their research and development involvement should be....

Now, within the theme that our [subcommittee] chairman, Congressman [Duncan] Hunter, is going to put on this competition for ideas, the prize is that if we select the technology suggestion of one yard or the other yard, they get to do the engineering work to flesh that idea out and turn it from just an idea into a real piece of equipment or a change to the submarine and then it gets incorporated into that central design and then both builders will build it and incorporate it in the submarines from whatever point that is injected into the production line forward.[31]

Secretary Douglass's written statement for the hearing similarly stated:

New innovation will not be stifled, but encouraged as more open lines of information exchange are developed between the two shipbuilders, and between the shipbuilder team and government. The teaming arrangement has specific provisions to enhance and upgrade future New Attack Submarines – these efforts may be joint or developed individually by the shipbuilders. Our process is designed to allow industry and the shipbuilders to compete for research and development funds based on innovative ideas for improving [the Virginia-class design's] capability, producibility and affordability.[32]

Earlier at the same hearing, another Navy witness – a captain involved in the management of the Virginia-class acquisition program, in explaining the various reasons why the Virginia class would be affordable, talked about how the modular construction process for the Virginia-class design would allow new technologies to be inserted into the design over time:

Now, one of the things that this [modular construction process] affords us is the opportunity as we go along to adjust the design of these individual modules as the two companies compete for technology insertion, to bring that additional innovation to bear as we complete the construction of the submarine.[33]

Similarly, at an April 8, 1997 hearing before the Seapower subcommittee of the Senate Armed Services Committee on submarine programs, Secretary Douglass, in his opening presentation to the subcommittee, discussed the proposed teaming arrangement for the Virginia class, stated:

It is also important to remember that if you want to keep your industrial base viable, as you put it, sir, you must do more than just build things. You have to have an engineering force that can look forward into the future and constantly improve the product. This teaming arrangement is going to make that substantially easier to do. In a competitive [construction] environment, it is extremely difficult to get the two competitors to share their best ideas.

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[31]Ibid., p. 298-299.

[32]Ibid., p. 328.

[33]Testimony of Captain Burgess. Ibid., p. 244.

> Regarding this teaming arrangement, there is evidence that they are already over that hurdle and are sharing their ideas. We have a common technology insertion plan that will come into effect – as I will show you on the next couple of charts – in which we are allowing the shipbuilders to become involved in the future designs of these submarines in a way we have never done before. They sit on a Submarine Technology Oversight Council that Dr. Paul Kaminsky[34] and I co-chair. The presidents of the two shipyards sit with us. There is a very strong and keen competition for ideas about how to improve these submarines. For example, whichever yard brings us the best technology ideas will be the yard to take that idea and get it into the detailed design process. Then they will both build to that new innovative design.[35]

The issue came up again later in the hearing in this exchange:

> [Senator Joseph Lieberman:] But my question is this: Some have raised this question about the teaming concept, which is that we lose all the benefits of competition as a result of the teaming. I wonder if one of you, maybe Secretary Douglass, would answer that or begin to answer that, which is[:] does the teaming agreement eliminate all competition from the submarine construction program?
>
> Mr. Douglass: No sir, it does not eliminate all competition. There is still considerable competition down at the subcontractor level, at the second, third, and fourth tiers of the industrial base in which we have two or more suppliers who have other businesses that they do in addition to supplying us so that we could compete between them.
>
> Also, while you were out, I discussed the competition of ideas that will be in effect in which the engineering teams at both shipyards will be, in a sense, competing against each other to keep themselves in business. We are going to pick from the ideas that come out of those two shipyard engineering teams the very best ones to insert into future boats. So there is a technology competition there, as well.[36]

Supporters of the GD-NNS merger proposal can argue that, as it turned out, NNS has not done much work in submarine design and technology development since 1997. Opponents can argue in turn that a GD-NNS merger would nevertheless deprive the Navy of the option of going to an independently-owned NNS at some point in the future to resume a more active competition in this area. Such a competition, they could argue, might become more possible if the NOC-NNS merger proposal were approved, since the NNS engineering team's ability to participate in such a competition could be enhanced by exposure to additional technologies available within NOC.

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[34]Dr. Kaminsky was then the Under Secretary of Defense for Acquisition and Technology – DoD's top acquisition executive.

[35]U.S. Congress. Senate. Committee on Armed Services. [Hearings on] Department of Defense Authorization for Appropriations for Fiscal Year 1998 and the Future Years Defense Program. 105th Cong., 1st Sess., Part 2, Seapower. Washington, U.S. Govt. Print. Off., 1998. (S. Hrg. 105-37, Pt. 2, march 19, April 8, 22, 1997.) p. 166.

[36]Ibid., p. 189-190.

Supporters of the GD-NNS merger proposal can argue that competition in submarine design and technology development can still take place within a combined GD-NNS entity through the creation of two or more industry teams under GD's supervision that are administratively separated ("firewalled") from one another and contain team members from other firms. Under this arrangement, the other firms would each belong to one team and not the other. Thus, although GD would have engineers on both teams and would stand to gain whichever team wins the competition, other firms contributing to the teams would stand to gain only if the team to which they contributed engineers wins the competition. The concept is somewhat similar to using competition among suppliers and component manufactures when competition at the level of the final-assembly firm is not possible.

This kind of arrangement, supporters of the GD-NNS merger proposal can argue, was recently used with success in the Navy/Defense Advanced Projects Research Agency (DARPA)-managed submarine payloads project, which was aimed at generating new and innovative ideas for significantly increasing the number and variety of weapons and sensors carried by the Navy's attack submarines. GD participated on both of the industry teams that were organized to compete under Navy/DARPA supervision, but the teams were firewalled and (except for participants from GD and a couple of other firms) consisted of members of firms that provided participants to only one of the two teams.[37] This project, supporters can argue, succeeded in generating ideas that, if developed and implemented, could completely transform the design and capabilities of the Navy's attack submarines.[38]

Opponents of the GD-NNS merger proposal, while acknowledging the possibility of using firewalled teams, could argue that such an arrangement might not be as effective as an arrangement using teams whose members included participants from two separate submarine-building firms, particularly for generating innovations – such as those that might permit submarine missions to be performed by significantly fewer submarines or by platforms other than submarines – that might threaten the value of GD-NNS' status as the sole source for building submarines.

Cross-subsidization of Bids. Opponents of the GD-NNS merger proposal could argue that a GD-NNS entity could use its sole-source status on aircraft carriers and submarines to leverage carrier and submarine construction contracts with high profit margins that could then be used to cross-subsidize bids that GD-NNS would make in competitions against NOC for contracts relating to surface combatants, amphibious ships, and auxiliary and sealift ships.

Supporters of the GD-NNS merger proposal could argue that the government would be fully capable of auditing the costs relating to the GD-NNS's work on

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[37]The two teams were led by Lockheed and Raytheon.

[38]For a brief mention of the Navy/DARPA submarine payloads project, see Statement of Ronald O'Rourke, Specialist in National Defense, Congressional Research Service, Before the House Armed Services Committee Subcommittee on Military Procurement Hearing on Submarine Force Structure and Modernization, June 27, 2000, p. 20. The second phase of the project, now under Navy (rather than joint Navy/DARPA) supervision, is progress.

carriers and submarines to ensure that profits on this work were not excessive and that cross-subsidization would not take place.

Market Share. Using the figures from Table 2 above, a combined GD-NNS entity would account for about 70 % of the combined revenues of the six major Navy shipbuilders. NOC would have the remaining 30%.

Supporters of the GD-NNS merger proposal could argue that share of revenues does not, by itself, mean anything – and that DoD tacitly acknowledged this by not mentioning market share in its analysis of the 1999 GD-NNS merger proposal. NOC, they could argue, already builds surface combatants, amphibious ships, and auxiliary and sealift ships and thus does face a choice of whether to enter the market to build ships of this kind. Since it does not face this choice, supporters of the GD-NNS merger proposal could argue, the question of whether the GD-NNS entity's market share would discourage NOC from entering the market for these ships would be moot.

Opponents of the GD-NNS merger proposal could argue in turn that market share is a potentially important indicator because it indicates a firm's potential, relative to its competitors, to achieve improved production economies of scale and obtain materials and components from supplier firms at lower costs. A firm with a dominant share of the market, it can be argued, could make it more difficult for the government to achieve meaningful competition because that firm might be able to generate size-related cost advantages that could not be matched by other firms with a smaller share of the market. A firm with a dominant share of the market, it can also be argued, might be better able to attract the best managers and engineers because those individuals might conclude that the firm with the dominant share of the market had better long-term business prospects and could thus offer them better long-term career opportunities. Over time, it could be argued, an advantage in recruiting the best managers and engineers could add to the competitiveness of the firm with the dominant share of the market, making it more difficult for the government to achieve effective competition.

Number of Shipyard In-house Design and Engineering Staffs. A GD-NNS merger (like a NOC-NNS merger) would reduce the number of shipyard in-house design and engineering staffs from three to two. As discussed earlier, a reduction in the potential for innovation caused by the reduction in the number of independently owned shipyard staffs might be offset by the creation at the GD-NNS entity of a larger design and engineering staff that might, for a time at least, be able to generate significant innovations by combining people and ideas that were previously separate from one another.

Share of Shipyard In-house Designers and Engineers. A GD-NNS merger would produce a firm that, on the basis of the data for 2001 shown in Table 3, would have more than 80% of the six yards' in-house designers and engineers. NOC would have less than 20%. These percentage-share figures are almost unchanged from 1999.

Supporters of the GD-NNS merger proposal can argue that the 80-percent figure significantly misrepresents the situation because 8,000 of the 9,850 designers and

engineers at a combined GD-NNS entity – the 3,400 designers and engineers at EB and the 4,600 designers and engineers at NNS – are nuclear-ship designers and engineers who are dedicated exclusively to nuclear shipbuilding and overhaul programs at EB and NNS. These nuclear-ship designers and engineers, they can argue, are simply not available to work on non-nuclear shipbuilding programs where a combined GD-NNS would face competition from NOC. Any transfers of nuclear-ship designers and engineers from nuclear to non-nuclear shipbuilding programs, they can argue, would be at most rare and insignificant occurrences. Subtracting out these 8,000 nuclear-ship designers and engineers, they can argue, leaves GD with 1,850 designers and engineers to work on non-nuclear shipbuilding programs – a figure somewhat smaller than NOC's 2,150 in-house ship designers and engineers.

Supporters of the GD-NNS merger proposal can also argue that NOC could, if it desired, supplement its own in-house staff of 2,150 shipyard designers and engineers by contracting with some of the 6,000 private-sector ship designers and engineers that exist in the United States outside the six shipyards – an established practice for shipyards working on Navy non-nuclear shipbuilding programs – and by drawing on the talents of the many in-house designers and engineers that exist in the aerospace and electronics divisions of NOC.

Opponents of the GD-NNS merger proposal can argue that designers and engineers involved in nuclear shipbuilding programs at EB and NNS can be – and have been – made available for temporary assignment to non-nuclear shipbuilding programs, where their experience in working on shipbuilding programs and their general design and engineering skills can be of value. Opponents can point to one recent press report which states: "GD Electric Boat spokesman Neil Ruenzel said that some of the [EB] engineering staff has worked from time to time on surface combatant tasks on behalf of GD's Bath Iron Works of Bath, Maine."[39] They can also note that NNS in the 1990s signed contracts to design and build several conventionally powered 46,000-deadweight-ton double-hulled commercial petroleum tankers.[40]

Opponents of the GD-NNS merger proposal can also argue that even if nuclear-ship designers and engineers are not reassigned to non-nuclear shipbuilding programs, some of the technologies they might develop in support of nuclear shipbuilding programs could still be applied to non-nuclear shipbuilding programs to gain a competitive advantage in those programs. The ability to apply technology developed at EB and NNS by nuclear-ship designers and engineers to a non-nuclear-shipbuilding

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[39]McCarthy, Mike, and John M. Donnelly. Worries About Competition Surround Bids For Newport News. *Defense Week*, May 14, 2001: 1, 13, 15.

[40]The NNS effort to reenter the commercial ship construction market began in 1994 with the signing of contract with a Greek shipowner for the design and construction of two of these "Double Eagle" tankers. This was the first time since 1957 that a foreign buyer had contracted with any U.S. shipyard for the construction of an ocean-going commercial ship. By 1996, NNS had contracts to build up to 14 of the ships for various buyers. In March 1998, however, NNS determined that it would not be able to earn a profit building the ships and announced that it was withdrawing from commercial ship construction. A total of 5 Double Eagle tankers were eventually built, the last being delivered in 1999.

program, they can argue, was recently demonstrated in connection with the Navy's program for developing electric drive/integrated power systems – a technology that can be applied to either nuclear- or non-nuclear-powered ships: When the Navy in the second half of the 1990s began to express a growing interest in the idea of shifting from the use of traditional mechanical-drive systems for its ships to advanced electric-drive/integrated power systems, beginning with the planned DD-21 destroyer (a non-nuclear-powered ship), the only two U.S. firms of any kind that mounted efforts to propose designs for fully integrated electric-drive/integrated power systems (as opposed to specific components of such a system) were GD (including EB) and NNS.[41]

Opponents of the GD-NNS merger proposal can argue that it would be difficult for NOC to transfer designers and engineers from these divisions into shipbuilding programs, since the time of the these designers and engineers is fully committed to non-shipbuilding projects and because these designers and engineers lack experience in shipbuilding-related issues. They can argue that it is inconsistent to maintain that it would be difficult for GD-NNS to temporarily transfer nuclear ship designers and engineers to non-nuclear shipbuilding programs, but that it would not be difficult for NOC to temporarily transfer aerospace designers and engineers to shipbuilding programs.

Opponents of the GD-NNS merger proposal can also argue that a GD-NNS entity could contract for the services of the 6,000 ship designers and engineers that work outside the six yards just as easily as NOC could, and that even if NOC made greater use of these outside designers and engineers, they might not be able to achieve as much for NOC as GD-NNS's in-house designers and engineers could achieve for GD-NNS, since the latter would work at GD-NNS continuously across a range of projects, rather than intermittently on a project-by-project basis as would be the case for outside designers and engineers working on contract for NOC, and since the GD-NNS in-house designers and engineers potentially would have more complete access to GD-NNS's most proprietary concepts and technologies than the contract designers and engineers would have to NOC's concepts and technologies.

Share of Navy Research and Development Funding. As noted earlier, DoD in 1999 noted, in expressing its opposition to the 1999 GD-NNS merger proposal, that "over 95% of the Navy R&D investment would exist in a combined General-Dynamics-Newport News entity" and that this could result in a concentration of "the technology advantages that may have resulted from Navy-funded research and development investments in both firms over the years."

Supporters of the GD-NNS merger proposal can note that DoD in 1999 did not define in its public statements what it meant when it referred to "Navy R&D investment," or what basis it used to calculate the 95-percent figure. They can also argue that the 95-figure, if accurate in 1999, could now or in the future be much lower as the Navy shifts significant R&D funds into non-nuclear shipbuilding

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[41]For more on the Navy's electric-drive/integrated power system program, see CRS Report RL30622, *Electric-Drive Propulsion for U.S. Navy Ships: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 2000. (July 31, 2000.) 65 p.

programs such as the DD-21 destroyer, and as design activities related to the Virginia-class submarine program begin to wind down now that the Virginia-class design has entered production.

Supporters of the GD-NNS merger proposal can also argue that the Navy research and development funding that goes to the six yards is only a small portion of the total amount of research and development funding that the Navy spends each year. The vast majority of the Navy's annual research and development budget, they can point out, goes to entities other than the six shipyards, such as aerospace firms, electronics firms, laboratories, and universities, for research and development on things other than ships, such as aircraft, missiles, electronics, and basic science and technology, to name just a few.

Opponents of the GD-NNS merger proposal can argue that even if the 95 percent figure from 1999 is no longer accurate, a combined GD-NNS entity would still account for a very large share of the total amount of the Navy research and development funding that goes to the six shipyards. They can argue that the GD-NNS entity could receive a significant share of DD-21 research and development funds, particularly if the GD/BIW-led team wins the competition to design the DD-21, or if the GD-proposed electric-drive/integrated power system is chosen for the DD-21. They can also argue that submarine-related research and development funding might increase if the Navy decides to implement submarine-design proposals generated under the Navy/DARPA submarine payloads project, and that research and development funding related to aircraft carriers could increase as the Navy continues to develop its next-generation CVNX aircraft carrier.

Opponents of the GD-NNS merger proposal can also argue that it is of little significance that the Navy research and development funding that goes to the six shipyards accounts for only a small share of the Navy's total research and development budget, because the issue is how Navy funding provided to the yards sustains the activities of designers and engineers at the yards. If most of that funding – whatever share it might constitute of the Navy's total research and development budget – goes to a combined GD-NNS entity, they can argue, then the GD-NNS entity will be better able than NOC to generate new in-house ship design concepts and technologies that can incorporated into bids the firm submits for future ship acquisition programs.

Vertical Integration. Supporters of the GD-NNS merger proposal can argue that it does not raise any significant issues concerning vertical integration, since both GD and NNS are involved in the same stages of the shipbuilding process – ship design and engineering, and construction, final assembly, integration, and testing of ships at the shipyard level. A GD-NNS merger, they could argue, would not combine a shipyard with either a major supplier of basic shipbuilding materials and components or a major supplier of ship combat system equipment. A combined GD-NNS entity would continue to get these items from other firms.

Opponents of the GD-NNS proposal could argue that although GD is not currently a major provider of shipbuilding materials or a major combat system supplier for Navy ships, GD does make a few Navy ship components (such as part of a fire control radar installed on Aegis ships) and includes, in addition to its marine systems

(i.e., shipbuilding) division, an armaments division that makes guns and ammunition, an information systems and technology division that makes communications equipment, and an aerospace division (Gulfstream) that makes corporate jets. Opponents could argue that, in the future GD might seek to expand its role as a supplier of components for Navy ships.

Potential for Competition under NOC-NNS Proposal.

Creation of Sole Sources. The NOC-NNS merger proposal would not combine the nation's two submarine builders under common ownership, but it would combine NNS, the longstanding sole source for large-deck, nuclear-powered aircraft carriers, with NOC's Avondale and Ingalls shipyards, which, as discussed in a 1996 CRS report, are the only two yards other than NNS that could build large-deck, conventionally powered aircraft carriers.[42] The NOC-NNS merger proposal would also combine NOC's Ingalls shipyard, the effective sole source for large-deck amphibious assault ships,[43] with NNS, the only other shipyard currently outside NOC (i.e., other than Avondale) that, as also discussed in the 1996 CRS report,[44] could build large-deck amphibious assault ships without need for making major capital improvements to the yard.

Competition in Aircraft Carrier Construction. Supporters of the NOC-NNS merger proposal could argue that the loss of potential competition in aircraft carrier construction is insignificant because carriers have been a sole-source item since FY1958, because carriers in future decades (as in recent decades) will not be procured at a rate sufficient to support meaningful competition between two sources, because the Navy's plans for carrier procurement call for future carriers to be nuclear-powered ships, which Avondale and Ingalls cannot build, and because even if the Navy were to procure conventionally powered carriers, Avondale and Ingalls would not be competitive in bidding for such ships because of their lack of recent experience in building such ships and the technical challenges specific to building carriers, such as installing aircraft catapults.

Opponents of the NOC-NNS merger proposal could argue that the loss of potential competition in carrier construction is possibly significant because the Navy at some point might decide to shift carrier construction from large-deck, nuclear-powered designs to non-nuclear-powered designs that could be built by Avondale or Ingalls, but not by GD's two surface-ship yards (BIW and NASSCO). The concept of building smaller (and potentially non-nuclear-powered) carriers was reportedly examined as part of the Bush Administration's top-to-bottom review of U.S. defense

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[42]The potential for Avondale or Ingalls, with capital improvement, to build large-deck conventionally powered carriers, was discussed in CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, by Ronald O'Rourke. Washington, 1996. (September 24, 1996) p. 21, 23, 29, 61-62.

[43]Large-deck amphibious assault ships are flat-top ships about 40 % as large as the Navy's aircraft carriers that are used to embark Marine forces and their equipment, including a small air wing of Marine helicopters and AV-8B Harrier vertical/short take off and landing (V/STOL) jet airplanes.

[44]CRS Report 96-785 F, p. 29.

strategy and programs, and could be examined again at some point in the future. A NOC-NNS merger, opponents could argue, could permanently preclude the Navy from using competition in the construction of such ships.

Competition in Amphibious Assault Ship Construction. Supporters of the NOC-NNS merger proposal could argue that the loss of potential competition in the construction of amphibious assault ships is not significant because these ships, like carriers, have effectively been a sole source item for many years, because, like carriers, these ships in future years (as in past years) will not be procured at a rate sufficient to support meaningful competition between two sources, and because NNS would not be competitive in bidding for such ships because of its lack of recent experience in building them and because the overhead costs associated with maintaining NNS's nuclear shipbuilding capability make it difficult for NNS to compete effectively for non-nuclear-powered ships against yards, like Ingalls, that do not have to incorporate the overhead costs of maintaining a nuclear shipbuilding capability into their bids. They could also argue that either of GD's two surface-ship yards – BIW or NASSCO – could be made capable, with capital improvements, of building such ships.

Opponents of the NOC-NNS merger proposal could argue that the potential loss of competition in the construction of amphibious assault ships is possibly significant because future plans for the Navy might call for building such ships in greater numbers or to a new and significantly different design for which Ingalls' prior experience in building amphibious assault ships would not be an advantage, and because the amount of capital improvements that would be needed at BIW or NASSCO to make these yards capable of building such ships would dissuade them from competing against Ingalls for such ships, leaving NNS as the most likely potential competitor. They can argue that, in spite of its nuclear-related overhead costs, NNS has been successful in recent years in competing against non-nuclear yards for non-nuclear ship acquisition projects such as the conversion of existing merchant ships into U.S. military sealift ships.

Cross-subsidization of Bids. Opponents of the NOC-NNS merger proposal could argue that a NOC-NNS entity could use its sole-source status on aircraft carriers to leverage carrier construction contracts with high profit margins that could then be used to cross-subsidize bids that NOC-NNS would make in competitions against GD for contracts relating not only to submarines (which NNS could do previously), but also for contracts relating to surface combatants, amphibious ships, and auxiliary and sealift ships made by Ingalls and Avondale.

Supporters of the NOC-NNS merger proposal could argue that the government would be fully capable of auditing the costs relating to the NOC-NNS's work on carriers to ensure that profits on this work were not excessive and that cross-subsidization would not take place.

Market Share. Using the figures from Table 2 above, a combined NOC-NNS entity would account for about 58 % of the combined revenues of the six major Navy shipbuilders. GD would have the remaining 42%.

Supporters of the NOC-NNS merger proposal could argue that this division of revenues, though not exactly 50-50, is not nearly as imbalanced as the 70-30 division that would result from a GD-NNS merger. They could also argue, as supporters of the GD-NNS proposal could argue, that share of revenues does not, by itself, mean anything – and that DoD tacitly acknowledged this by not mentioning mention market share in its analysis of the 1999 GD-NNS merger proposal. GD, they could argue, already builds surface combatants, amphibious ships, and auxiliary and sealift ships and thus does face a choice of whether to enter the market to build ships of this kind. Since it does not face this choice, supporters of the NOC-NNS merger proposal could argue, the question of whether the NOC-NNS entity's market share would discourage GD from entering the market for these ships would be moot.

Opponents of the NOC-NNS merger proposal, like opponents of the GD-NNS merger proposal, could argue in turn that market share is a potentially important indicator because it indicates a firm's potential, relative to its competitors, to achieve improved production economies of scale and obtain materials and components from supplier firms at lower costs. A firm with a dominant share of the market, it can be argued, could make it more difficult for the government to achieve meaningful competition because that firm might be able to generate size-related cost advantages that could not be matched by other firms with a smaller share of the market. A firm with a dominant share of the market, it can also be argued, might be better able to attract the best managers and engineers because those individuals might conclude that the firm with the dominant share of the market had better long-term business prospects and could thus offer them better long-term career opportunities. Over time, it could be argued, such an advantage in recruiting the best managers and engineers could add to the competitiveness of the firm with the dominant share of the market, making it more difficult for the government to achieve effective competition.

Number of Shipyard In-house Design and Engineering Staffs. A NOC-NNS merger (like a GD-NNS merger) would reduce the number of shipyard in-house design and engineering staffs from three to two. As discussed earlier, a reduction in the potential for innovation caused by the reduction in the number of independently owned shipyard staffs might be offset by the creation at the NOC-NNS entity of a larger design and engineering staff that might, for a time at least, be able to generate significant innovations by combining people and ideas that were previously separate from one another.

Share of Shipyard In-house Designers and Engineers. A NOC-NNS merger would produce a firm that, on the basis of the data for 2001 shown in Table 3, would have about 56% of the six yards' in-house designers and engineers. GD would have the remaining 44%. These percentage-share figures are somewhat changed from 1999, when the merger would have resulted in a 52-48 split.

Excluding the 8,000 nuclear-ship engineers and designers at NNS and GD, NOC-NNS merger would have 54% of the in-house designers and engineers (2,150 of 4,000), while GD would have the remaining 46 % (1,850 of 4,000).

Supporters of the NOC-NNS merger proposal could argue that an approximate 55-45 division of in-house designers and engineers, though not exactly a 50-50 split, is not nearly as imbalanced as the 82-18 division (including nuclear-ship designers and

engineers) that would result from a GD-NNS merger. They can also argue that GD can supplement its own in-house staff of 5,400 shipyard designers and engineers by contracting with some of the 6,000 private-sector designers and engineers that exist in the United States outside the six shipyards, and by drawing on the talents of the designers and engineers that exist in the information systems and technology and aerospace divisions of GD.

Opponents of the NOC-NNS merger proposal can argue that the 56-percent figure understates the situation because a combined NOC-NNS entity would combine the talents of 6,750 in-house shipyard designers with those of the designers and engineers in NOC's large and technically advanced aerospace and electronics divisions. The resulting diversified combination of extensive nuclear and non-nuclear shipbuilding technologies, aerospace technologies (including stealth design and materials technology) and electronics technology, they could argue, could give a combined NOC-NNS entity a technological edge over GD, making it more difficult for the Navy to achieve effective competition in shipbuilding programs.

Opponents of the NOC-NNS merger proposal can also argue that it would be difficult to transfer designers and engineers from GD's information systems and technology and aerospace divisions into shipbuilding programs, since the time of these designers and engineers is fully committed to non-shipbuilding programs and because these designers and engineers lack experience in shipbuilding-related issues.

Opponents of the NOC-NNS merger proposal can also argue that a NOC-NNS entity could contract for the services of the 6,000 ship designers and engineers that work outside the six yards just as easily as GD could, and that even if GD made greater use of these outside designers and engineers, they might not be able to achieve as much for GD as NOC-NNS's in-house designers and engineers could achieve for NOC-NNS, since the latter would work at NOC-NNS continuously across a range of projects, rather than intermittently on a project-by-project basis as would be the case for outside designers and engineers working on contract at GD, and since the NOC-NNS in-house designers and engineers potentially would have more complete access to NOC-NNS's most proprietary concepts and technologies than the contract designers and engineers would have to GD's concepts and technologies.

Share of Navy Research and Development Funding. Although DoD in 1999 stated that more than 95% of the Navy research and development investment that goes to the six shipyards would exist in a combined GD-NNS entity, it did not say how much of this 95% came from GD as opposed to NNS. Since DoD did, however, say that " the Navy has historically maintained a large R&D program funded through its nuclear shipyards; i.e., General Dynamic's [sic] Electric Boat Division and Newport News," it might be reasonable to assume that a significant share of this 95% came from NNS. If so, then a NOC-NNS merger might result in a division of the Navy research and development funding directed to the shipyards that would be much closer to a 50-50 split than to a 95-5 split.

Supporters of the NOC-NNS merger proposal could argue that the resulting division of shipyard-directed Navy research and development funding would be relatively balanced between a NOC-NNS entity and GD, which would make it easier

for the Navy to maintain effective competition between NOC-NNS and GD in ship acquisition.

Opponents of the NOC-NNS merger proposal could argue that the resulting division of shipyard-directed Navy research and development funding would understate the advantages of a combined NOC-NNS entity because NOC-NNS would benefit from the very large amount of research and development funding that DoD has directed over the years to aerospace firms like NOC. In the case of NOC, they could argue, this would include a large investment in stealth design techniques, materials, production tooling, and test facilities established for the B-2 bomber, which NOC designed and built. This advantage in DoD research and development funding, they could argue, will continue into the future as DoD continues to invest in research and development activities at aerospace firms such as NOC. The combination of shipyard-directed Navy research and development funding and DoD research and development funding for aerospace technologies, opponents of the NOC-NNS merger proposal could argue, would give NOC-NNS a significant advantage over GD and make it more difficult for the Navy to achieve effective competition between NOC-NNS and GD in ship acquisition.

Vertical Integration. NOC is one of DoD's leading radar makers and combat system integrators, and competes against other radar makers and combat system integrators, such as Lockheed and Raytheon. NOC is also a maker of Navy ship propulsion equipment. NOC's April 2001 purchase of Litton's Avondale and Ingalls shipyards thus posed a question of vertical integration, since it combined a maker of military platforms (i.e., surface combatants, amphibious ships, and auxiliary and sealift ships) with a maker of radars, combat systems, and ship propulsion equipment that could go onto those platforms. The NOC-NNS merger proposal raises this question again and extends it to the two remaining major categories of Navy ships – aircraft carriers and submarines.

Opponents could argue that a NOC-NNS merger would create a firm with an undesirable degree of vertical integration. Such a firm, opponents could argue, could decide to install its own radars and combat systems on the ships it makes, rather than competing its in-house capabilities in this area against the other radar makers and combat system integrators such as Lockheed and Raytheon. This, opponents could argue, would make it difficult for the Navy to achieve effective competition in the acquisition of ship radars and combat systems. A weakening of competition between system-integration firms, they could argue, would be particularly significant in light of the government's increasing reliance on system-integrator firms as sources of design and technology innovation in Navy shipbuilding.

Supporters of the NOC-NNS merger proposal could argue that it is unlikely that a NOC-NNS entity would exclude Lockheed and Raytheon from NOC-NNS shipbuilding projects, because radars and combat systems on ships are different in many ways from radars and combat systems on aircraft, and NOC's experience in radars and combat systems is associated more with aircraft, while Lockheed and Raytheon are the two leading makers of radars and combat systems for Navy ships. Supporters could argue that it would be self-defeating for NOC-NNS to exclude both Lockheed and Raytheon from its bid in a competitive ship-acquisition program, since that would leave GD free to include one or even both of these firms in its own bid,

making it much more likely that the Navy would judge the GD bid superior in terms of proven experience in shipboard radars and combat systems.

Potential Effect On Shipyard Employment Levels

Members of Congress are often interested in the effect that defense mergers and acquisitions might have on local or regional employment levels. Shipyard mergers, particularly if they are to produce savings, can lead to reductions in the total number of white-collar workers (i.e., headquarters and central administrative workers, and possibly designers and engineers) employed at the yards being brought under common ownership. As mentioned in the section on potential savings, bringing more than one shipyard under common ownership can provide opportunities to the parent firm to combine and streamline the total number of workers in these areas.

Shipyard mergers are unlikely to lead to significant changes in the total number of blue-collar production workers employed at the yards, since that number is determined primarily by the total amount of production work being done at the yards. Shipyard mergers, however, can lead to changes in the distribution of work being done at the yards being brought under common ownership, which can in turn alter the distribution of the total number of blue-collar workers among the yards.

The managers of a multi-yard organization can rephase work at certain yards, or shift work from one yard to another, so as to avoid or minimize potentially expensive fluctuations in the workload at individual yards or take advantage of the ability of one yard to perform certain elements of work at lower cost. For shipbuilding organizations with facilities in multiple localities or regions, which both GD-NNS or NOC-NNS would be – such changes in the distribution of blue-collar workers across the yards can lead to local or regional increases or reductions in blue-collar shipbuilding employment.

In discussing the potential local employment impacts of shipyard mergers, the potential employment impact of *not* participating in a merger arguably should also be considered. It is possible, for example, that not merging might leave a yard in weakened competitive position relative to other yards that do merge. In the long run, this weakened competitive position could reduce the amount of work awarded to that yard, and thus the number of employees sustained there. A nearer-term reduction in employment that might result from a merger might not be as significant as a longer-term reduction that might result from not merging.

Shipyard Employment under GD-NNS Merger. Production workers at EB's submarine shipyard at Groton, CT were concerned in 1999 that a GD-NNS merger could lead to the transfer of submarine production jobs from Groton to NNS. The unionized production workers at Groton, where the later stages of EB's submarine production process occur, were particularly sensitive to this possibility because EB over the years has transferred increasing portions of the earlier stages of the production process to a newer production facility EB built at Quonset Point, RI that employs non-union workers.

In announcing the GD-NNS merger proposal, GD stated that it would not close any of its shipyards or carry out any reductions in force (RIFs) – that is, layoffs – of

production workers or designers or engineers following a GD-NNS merger. In addition, EB on May 16, 2001 signed a memorandum of Agreement (MOA) with the Metal Trades Council of New London County AFL-CIO, a union representing blue-collar production workers at EB's submarine shipyard at Groton, CT (near New London, CT), which states the following:

> Upon completion of the acquisition [of NNS], work performed at Electric Boat on Virginia class submarines, under the terms of the existing Teaming Agreement with Newport New Shipbuilding, will not be moved to the Newport News shipyard as a result of the acquisition. Additionally there will be no reduction in force as a result of this acquisition. This MOA shall apply through delivery of SSN 776, currently scheduled for 2006.
>
> The Union agrees to support and endorse the proposed acquisition.[45]

SSN-776 is the third Virginia-class boat. The teaming arrangement for the Virginia class calls for EB to build certain parts of each of the first four boats, for NNS to build certain other parts of each of the first four boats, for the first and third boats (SSN-774 and SSN-776) to undergo final assembly at EB, and for the second and fourth boats (SSN-775 and SSN-777) to undergo final assembly at NNS. In addition, the yard doing final assembly work for a boat will build and install the nuclear propulsion plant for that boat. The Navy, GD, and NNS all anticipate continuing the teaming arrangement beyond the first four boats.

GD's general statement regarding no shipyard closures and RIFs, coupled with its commitments in the MOA with the Metal Trades Council, reduces but does not eliminate the potential scope of any redistribution of production workers at the shipyards of a combined GD-NNS between now and 2006. During this period, however, it would appear that a combined GD-NNS entity would have the option, if it desired, of changing the percentage distribution of workers at GD-NNS yards by increasing employment levels at one or more of its four sites (BIW, NNS, EB/Groton and EB/Quonset Point) while reducing employment levels through natural attrition of the workforce (i.e., retirements and voluntary departures) at one or more of these sites.

During this period, a combined GD-NNS entity would have the option of shifting elements of work relating to surface-ship construction between NNS and BIW, which could affect employment levels at these two sites. Shifting surface-ship construction work into or out of GD-NNS's third surface-ship yard – NASSCO in San Diego – is also possible but is perhaps less likely given NASSCO's distance from BIW and NNS.

In the longer run – that is, after delivery of SSN-776 in 2006 – the potential scope of redistribution of blue-collar jobs would appear to increase because GD-NNS at that point would no longer be prevented from shifting submarine production work out of EB/Groton. Some observers have speculated that a combined GD-NNS entity

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[45]Memorandum of Agreement (MOA) Between Electric Boat Corporation (Company) and Metal Trades Council of New London County AFL-CIO (Union), dated May 16, 2001. Copy of document provided to CRS by General Dynamics, May 18, 2001.

over the longer run might consider restructuring its nuclear shipbuilding activities in one of two ways:

- Consolidate submarine production at EB and focus NNS more exclusively on aircraft carrier production. By transferring submarine production work from NNS to EB, this option could reduce employment levels at NNS and increase them at EB.

- Consolidate submarine production at EB/Quonset Point and NNS, while maintaining EB/Groton primarily as submarine design and technology-development activity. By transferring submarine production work from EB/Groton to NNS, this option could reduce employment levels at EB/Groton and increase them at NNS.

Although both of these options have been the subject of speculation, it is not clear that a combined GD-NNS entity would see either as being in its best business interests. The first option, for example, could make it more difficult to sustain nuclear-related shipbuilding skills at NNS in the years between the Navy's infrequent procurements of aircraft carriers. The second option could reduce day-to-day communication between GD's submarine designers and engineers and its submarine production workers by geographically separating them from one another. Communication between submarine designers and production workers has been viewed as highly beneficial in terms of ensuring that submarine designs reflect the production workers' experience and advice regarding submarine "producibility" – the ease or difficulty of actually building a submarine design, and resulting affect on the submarine's construction cost.

Shipyard Employment under NOC-NNS Merger. NOC has stated that it has no plans to close any facilities following a NOC-NNS merger.[46] A combined NOC-NNS would continue to perform nuclear shipbuilding work at NNS, and might be likely to maintain Avondale's current focus on auxiliary, sealift, and LPD-type amphibious ships and Ingalls' current focus on complex surface combatants and LHD-type amphibious assault ships.

NOC-NNS, however, would have the option of shifting certain elements of surface-ship construction work between these yards, which could increase or reduce the blue-collar employment level at each yard. Ship sections produced at one yard, for example, could be barged to another yard to undergo final assembly along with ship sections produced at the final assembly yard.

The following instances of potential or actual cooperation or work sharing between these three yards can also be noted, though their value in predicting the future distribution of workload following a NOC-NNS merger is open to debate:

- In September 1997, Avondale and Ingalls announced that they had signed an agreement establishing a framework for entering into teaming arrangements to bid for work on future Navy and commercial shipbuilding programs. Under

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[46]Source: Telephone conversation with a senior NOC official, May 16, 2001.

the terms of the agreement, "teaming and specific details of the teaming arrangements (including sharing of work) will be determined on a program by program basis as business opportunities develop." In making the announcement, the two yards announced that they had already entered into teaming arrangements to compete for the Navy's new ADC(X) auxiliary dry cargo ship program (now called the Lewis and Clark, or TAKE-1 class program), a program to build a new fleet of Coast Guard cutters, and a program to build commercial crude oil tankers for major oil companies.[47] (As it turned out, Ingalls did not join the Avondale-led team on the Coast Guard project.[48])

- In 1996-1997, NNS and Ingalls teamed together to bid for the contract to design and build a proposed Navy surface combatant (since canceled) called the arsenal ship or maritime fire support demonstrator.[49]

- In 1995, NNS and Ingalls teamed together to bid (unsuccessfully) for the contract to design and build the first three San Antonio (LPD-17) class amphibious ships.[50] Under the teaming arrangement, if NNS and Ingalls won this competition, NNS would have built the aft section of each ship, which would have been transported to Ingalls and joined to the Ingalls-built forward section of each ship.[51]

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[47]Avondale & Ingalls Execute Agreement to Pursue Shipbuilding Projects. Business Wire news service, September 4, 1997; Ingalls and Avondale Agree to Team for Future Programs. *Ingalls News*, September 4, 1997; Shipbuilders Announce Pact. Associated Press wire story, September 4, 1997; Ingalls, Avondale Form Shipbuilding Alliance. *Aerospace Daily*, September 5, 1997: 351B; Schweizer, Roman. Ingalls, Avondale Agree to Pursue Commercial, Navy Work Together. *Inside the Navy*, September 8, 1997: 4; Bender, Bryan. Ingalls, Avondale Shipyards Sign Teaming Agreement. *Defense Daily*, September 8, 1997: 392.

[48]This project is the Coast Guard's Integrated Deepwater System program, which is an effort to acquire an integrated system of cutters, aircraft, and command and control systems for the Coast Guard's deepwater operations. See CRS Report 98-830 F, *Coast Guard Integrated Deepwater System: Background and Issues for Congress*, by Ronald O'Rourke. Washington, 1998. (November 8, 2000) 14 p.

[49]See CRS Report 97-455 F, *Navy/DARPA Arsenal Ship Program: Issues and Options for Congress*, by Ronald O'Rourke. Washington, 1997. (April 18, 1997) p. 31. The arsenal ship program was terminated in October 1997; see CRS Report 97-1044 F, *Navy/DARPA Maritime Fire Support Demonstrator (Arsenal Ship) Program: Issues Arising From Its Termination*, by Ronald O'Rourke. Washington, 1997. (December 10, 1997) 6 p.

[50]The contract to build the first 3 ships in this class was instead awarded to a team led by Avondale that also included BIW, Hughes Aircraft Company of Fullerton, CA, and Intergraph Corporation of Waynesboro, VA. The Ingalls-NNS team also included NASSCO (for pre-construction support and post-construction overhaul work) and Lockheed Martin's Government Electronic Systems Division of Moorestown, NJ.

[51]Ingalls To Team With Other Companies To Bid For New Navy Ship Contract. Associated Press wire story, October 24, 1995; Walsh, Mark. Second Team Will Bid For LPD-17. *Defense Week*, October 30, 1995: 3; Walsh, Edward J. Shipbuilders Plan Computerized

(continued...)

- In 1992-1993, NNS and Ingalls submitted separate (and unsuccessful) bids for contracts to design and build new-construction sealift ships under a loose teaming arrangement between the two yards. Under the arrangement, if either yard won this competition, that yard would sub-contract some of the work to the other yard. NNS would have built the forward section of each ship, and Ingalls would have built the aft section. The winning yard would receive the section of the ship built by the other yard and then carry out final assembly of the ship.

- In the 1980s, Avondale and Ingalls shared work in the program to modernize and reactivate the Navy's Iowa (BB-61) class battleships.[52]

In theory, NOC-NNS at some point in the future might determine that a commitment not to close any shipyards following the NOC-NNS merger (i.e., as a direct consequence of the merger) had been fulfilled, and that NOC-NNS was now free to close shipyards for reasons unrelated to the merger. As in the case of a GD-NNS merger, however, a decision to close a shipyard completely might be very unlikely because it would likely cause a controversy in the community and state affected, and because closing a site would reduce the geographic base of support for NOC-NNS's shipbuilding programs. As in the case of a GD-NNS merger, a decision to significantly reduce the amount of production work (and employment levels) at a site while still keeping it open might be more likely.

Potential Effect on Shipyards' Strength In Political Process

Navy shipbuilding in effect competes in the DoD and congressional budgeting arenas against other DoD defense procurement priorities (such as aircraft, missiles, land-warfare systems, and defense communications and electronics) for limited DoD procurement dollars. In this competition, the six shipyards individually are not the largest competitors. As can be seen in Table 1, the six yards in March 2000 employed a total of about 54,600 people, or an average of about 9,000 people per yard, in most cases at one primary site (two sites in the case of EB). In contrast, Boeing currently employs 198,000 people in its military and civilian business activities, with major operations in 4 states and additional operations in 22 other states,[53] while Lockheed Martin currently employs a total of 130,000 people in its military and civilian business activities at 939 major and minor facilities in 457 cities and 45 states.[54]

Shipyard mergers can create (or merge shipyards into) larger corporations that have increased total numbers of employees and greater geographical distribution around the United States. Other things held equal, this can strengthen the position of the shipyards relative to other defense contractors in the political process. A GD-

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[51](...continued)
Design for New Amphib. *Sea Power*, February 1996.

[52]Ingalls and Avondale noted their sharing of work on this program in announcing their September 1997 agreement on future teaming arrangements.

[53]Source for figures: [http://www.boeing.com/companyoffices/aboutus/brief.html] .

[54]Source for figures: [http://www.lockheedmartin.com/about/ataglance.html] .

NNS merger would create a firm with a total of more than 63,000 employees (including 17,260 at NNS) with operations in several locations,[55] while a NOC-NNS merger would create a firm of more than 97,000 employees (including 17,260 at NNS) with operations in 44 states.[56]

Shipyard mergers can also lead to more unified and coordinated lobbying and public-relations efforts among the yards, which can also strengthen the position of the yards in the political process. When the six shipyards were owned by six separate organizations, the lobbying and public-relations efforts of some of the yards might contradict or undercut some efforts of other yards. Now that ownership of the six yards has been consolidated under three firms, this possibility appears to have been reduced. A further consolidation in ownership to two firms might reduce it further. In Congress, shipyard mergers encourage Members of Congress who represent individual shipyards to find common interests with Members who represent other shipyards owned by the same parent firm.

For advocates of increased spending on Navy shipbuilding, the increased strength of the six shipyards in the political process can be viewed as an advantage. For policymakers involved in establishing and executing certain policies and programs relating to Navy shipbuilding, this increased strength might pose complications.

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[55]GD currently employees a total of 46,000 people. Source for figure: [http://www.generaldynamics.com/overview/] .

[56]NOC currently employs a total of 80,000 people. Source for figures: [http://www.northropgrumman.com/news/new_faq_main.html] .